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SUBJECT TO REVISION

CENTER LAKE, KOSCIUSKO COUNTY

AQUATIC PLANT MANAGEMENT

PLAN UPDATE 2007

PREPARED FOR:

CENTER LAKE CONSERVATION ASSOCIATION
1212 EDGEWATER DRIVE
WARSAW, IN 46580

PREPARED BY:

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DECEMBER 14, 2007

Executive Summary

Center Lake Conservation Association contracted V3 Companies Ltd. (V3) to complete aquatic vegetation sampling in order to update an aquatic vegetation management plan which was created in 2005. The update was funded as part of the Lakes and River Enhancement fund (LARE) which was obtained by the Center Lake Conservation Association and the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife. Funding for the LARE program is provided by an annual fee charged to boat owners. This update will also serve as a prerequisite to continue LARE program funding to control exotic or nuisance species.

Center Lake is a 120-acre natural lake in Warsaw, Kosciusko County, Indiana. Aquatic plants are an essential part of healthy lake ecosystems. They provide fish habitat, stabilize sediments, and reduce shoreline erosion. Species of aquatic plants that create nuisance conditions and inhibit lake use require aquatic plant management plans. The purpose of the Aquatic Plant Management Plan is to identify aquatic weed problem areas, describe management objectives, prescribe management strategies, and determine funding needs and sources necessary for the control of invasive aquatic plants. Center Lake's primary nuisance species is Eurasian watermilfoil. Eurasian watermilfoil crowds out native plants reducing biodiversity, diminishes fish habitat and negatively impacts wetland habitats. Dense growths inhibit water recreation on Center Lake such as boating, swimming and fishing. The primary goal of Center Lake Conservation Association is to reduce the impact of Eurasian watermilfoil while preserving and enhancing native plant communities.

The following actions are proposed for 2008 to identify and treat areas with Eurasian watermilfoil re-growth, and document the overall health, diversity, and distribution of desirable native aquatic plants. A Target Species Distribution Map and Proposed Treatment Area Map will be created during early spring 2008 to determine the extent of follow-up chemical application that will be necessary to treat Eurasian watermilfoil. An early spring (3rd week of April to mid-May) systemic herbicide application of 2,4-D granular is proposed to treat any Eurasian watermilfoil that may re-grow from the 2007 herbicide application. Aquathol K will be used as an herbicide for up to 16 acres of curlyleaf pondweed if necessary. A proposed treatment area map should be created to determine the extent of follow-up chemical application that is necessary to treat Eurasian watermilfoil. A post treatment Tier II survey is proposed during the summer of 2008 to document diversity, distribution, and abundance of plant communities. Follow-up plant surveys and herbicide applications should be conducted during 2009 to ensure Eurasian watermilfoil is being controlled and native plant communities remain protected.

Acknowledgements

We would like to acknowledge Angela Sturdevant and Gwen White with IDNR's LARE program for providing funding and assistance in the completion of this study. We would like to recognize Ed Braun and Rod Edgell, IDNR District Fisheries Biologists, for consultation and information. We would like to acknowledge the Center Lake Conservation Association as the local sponsor that provided assistance and guidance including: Troy Turley, Dale Long, Neal Carlson, Bill Hilliard, and Charlie Wheeler. We would like to recognize Tony Cunningham and Leslie Cunningham of Weed Patrol for their mapping, recommendation and consultation. Finally, we would like to acknowledge V3 staff involved in the research, sampling and document preparation including: Juli Mason, Wally Levernier, Desiree Poole, Amy Halsall, Jessica Dunn and Ed Belmonte.

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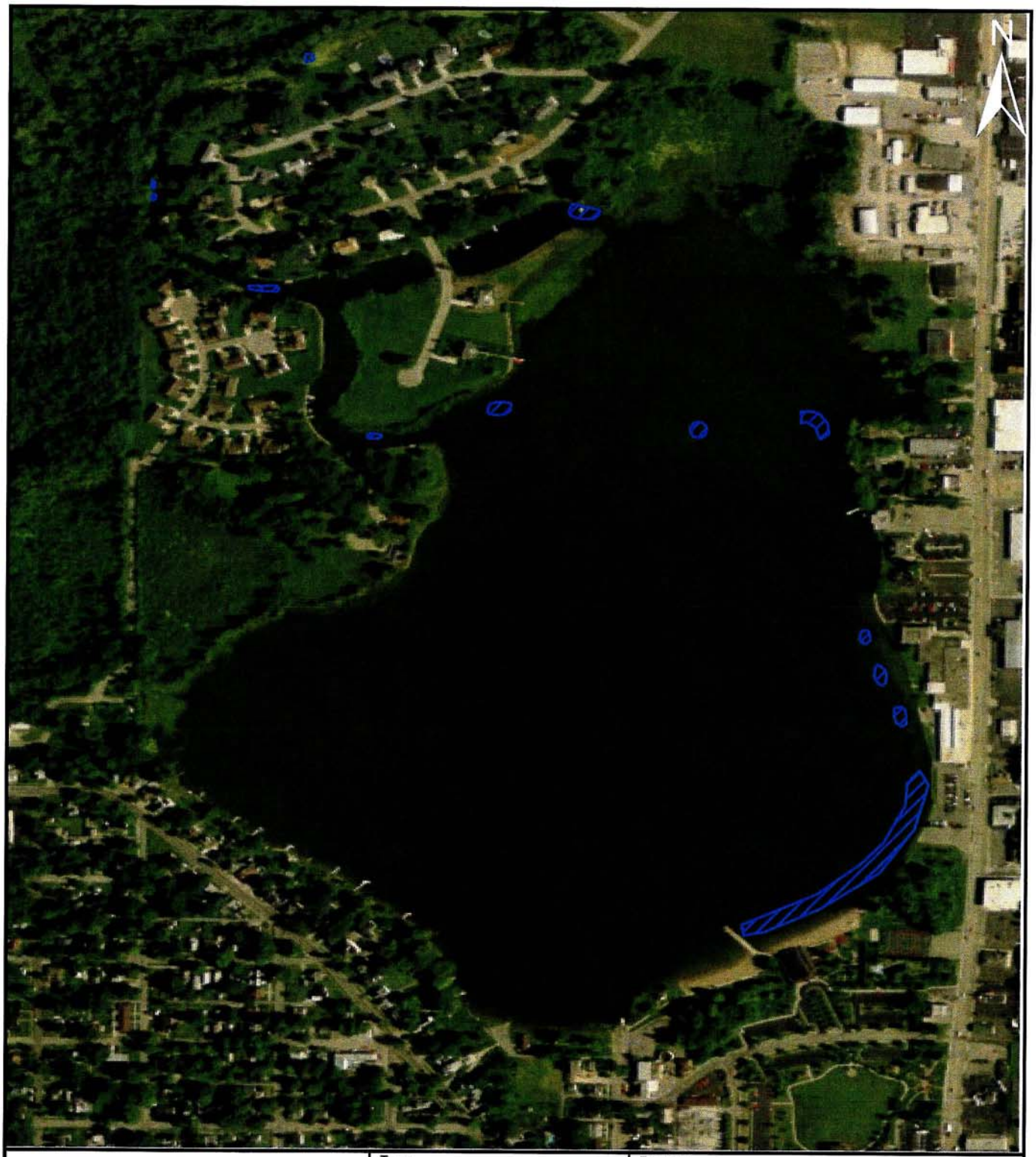
Introduction and Background

Center Lake is a 120-acre natural lake in Warsaw, Kosciusko County, Indiana. Center Lake has a maximum depth of 42 feet and average depth of 20 feet. The overall Center Lake watershed consists of 9,611 acres. The Center Lake watershed is comprised of three sub-watersheds: Center/Pike Lake (888 acres), Tippecanoe River (7,368 acres), and Walnut Creek (1,355 acres).

Eighteen acres of land along the southern shoreline of Center Lake are owned by the City of Warsaw for recreational uses including but not limited to public boat launch, public beach, gardens, picnic areas and open spaces (V3 2005). The public swimming beach is located along the southern shore.

Eurasian watermilfoil is an aggressive invasive aquatic species that can have a detrimental effect on the native aquatic plant community, provides poor fish habitat, inhibits boat navigation, and causes annoyances and serious health hazards to swimmers, and other members of the general public who wish to enjoy the lake. Eurasian watermilfoil has been present in Center Lake for many years and there have been many different approaches implemented to control its population. Biological (stocking weevils), chemical (various treatments) and physical (weed harvester) means of treatment have been implemented with varying levels of effectiveness. Pre-treatment distribution of Eurasian watermilfoil within Center Lake is seen in Exhibit I.

This report was created in order to update the Center Lake Aquatic Vegetation Management Plan which was funded by the Indiana Department of Natural Resources Lake and River Enhancement Program (LARE) and the Center Lake Conservation Association. This report will serve as a tool to track changes in vegetation community, monitor for invasive or nuisance species, to adjust the action plan, and to maintain eligibility for any additional LARE funding. Topics covered in this update include the 2007 sampling results, a review of the 2007 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, this report should be included in the original vegetation management plan, following the 2006 update.



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TITLE: **Pre-treatment Distribution of Eurasian Watermilfoil**		PROJECT: **Center Lake Aquatic Plant Management Plan**	
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 02218.03	EXHIBIT: I	SHEET: 1 OF: 1
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=7000'

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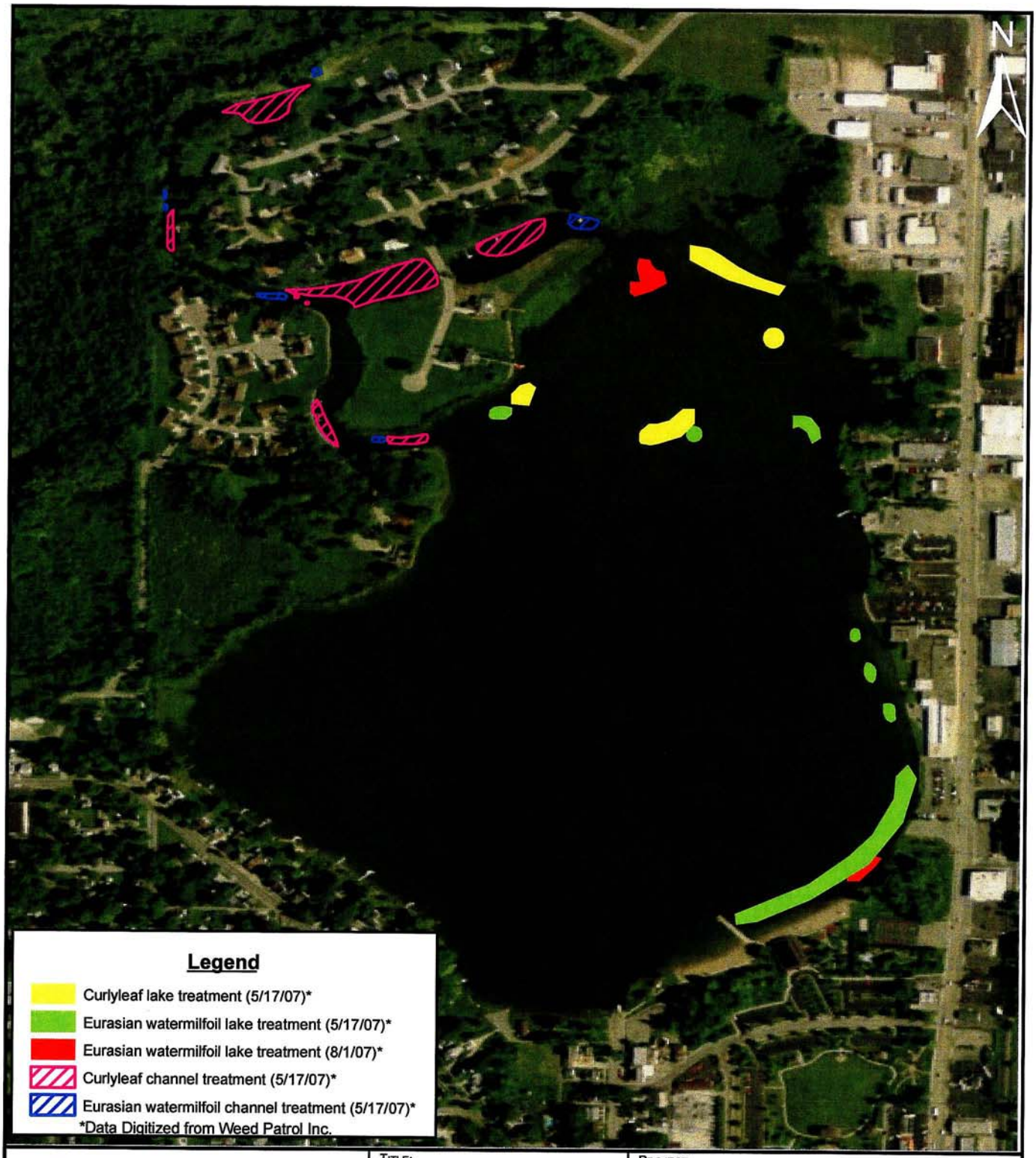
Problem Statement

Water quality in Center Lake has declined since the 1990s (Benson 2006). As summarized by V3 (2005), nutrient loading and low dissolved oxygen levels below the thermocline have been identified as the predominant water quality impairments to Center Lake. Nutrient influx from the man-made ditch connecting Center Lake to Lones Ditch, which flows from Pike Lake, provides additional pollutants and sediment into Center Lake from outside its natural watershed, degrading its water quality (V3 2005).

Eurasian watermilfoil is an aggressive, invasive aquatic species that can have a detrimental effect on the native aquatic plant community. This nuisance species grows and spreads rapidly, forming dense weed beds that outcompete native species for light and nutrients. In lakes where Eurasian watermilfoil is left unchecked, even well-diversified plant communities can become decimated and taken over by a single species.

In part due to water quality problems, Eurasian watermilfoil has been a dominant plant in Center Lake for many years. Center Lake was treated with Sonar aquatic herbicide in 1996, but Eurasian watermilfoil had reestablished its dominance by 2001 (Benson 2006). Approximately 35 acres infested with Eurasian watermilfoil were treated with Sonar during June 2005, and 22 acres were treated with Renovate3 during June 2006. Herbicide treatments for 2007 include: 2,4-D granular applied to 4.75 acres of Eurasian watermilfoil and 1.75 acres of curlyleaf pondweed with Aquathol K (Exhibit II). Treatments on Center Lake should be continued over three or four years to really eliminate all of the Eurasian watermilfoil.



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TITLE: **Eurasian Watermilfoil and Culyleaf Herbicide Treatments**	PROJECT: **Center Lake Aquatic Plant Management Plan**		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 02218.03	EXHIBIT: II	SHEET: 1 OF: 1
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=7200'

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Sampling Results

On July 25, 2007 a Tier II survey was conducted on Center Lake. The Tier II Aquatic Vegetation Survey Protocol, designated by the IDNR, serves as a standardized method to document the occurrence, distribution, and abundance of aquatic vegetation. The information collected is useful to monitor changes in the plant community over time and identify success or failure of the control techniques implemented. A table outlining the scientific and common names of species collected or observed in Center Lake is listed below (Table 1).

Table 1. Scientific and common names of species collected in Center Lake.

Scientific Name	Common Name
Ceratophyllum demersum	coontail
Chara spp.	chara species
Myriophyllum spicatum	Eurasian watermilfoil
Najas marina	spiny naiad
Nuphar variagetum	yellow pond lily
Nymphaea tuberosa	white water lily
Potamogeton gramineus	variable pondweed
Potamogeton illinoensis	Illinois pondweed
Potamogeton pectinatus	sago pondweed
Utricularia vulgaris	common bladderwort

Sampling Methodology for Summer Tier II Survey

Plant communities typically reach peak diversity between July 15 and August 31. One sampling effort occurred but it included a representative sample of the species within Center Lake. Center Lake required a total of fifty sampling stations based on trophic status and acreage. According to the IDNR protocol, Center Lake is classified as an oligotrophic trophic status which would require 10 sites from 15-20 feet and 20-25 feet. The maximum sampling depth for Center Lake is 15 feet. The Tier II sampling was conducted at the eutrophic status so that sampling locations were apportioned to the required depth class. Fifty sites were sampled within the littoral zone (23 sites 0 to 5ft, 17 sites 5 to 10ft, and 10 sites 10 to 15ft) (Exhibit III).

At each station a sampling rake is used for collecting vegetation samples. Once a species is identified vegetation abundance is scored as a 1 (1-19%), 3 (20-99%), or 5 (+100%) based on density on the rake. Species are scored as a 9 if they are observed within the vicinity of the sampling station but not collected. After completion of all sampling stations a secchi disk reading and water quality measurements are taken to complete the field effort.

Results of Summer Tier II Survey

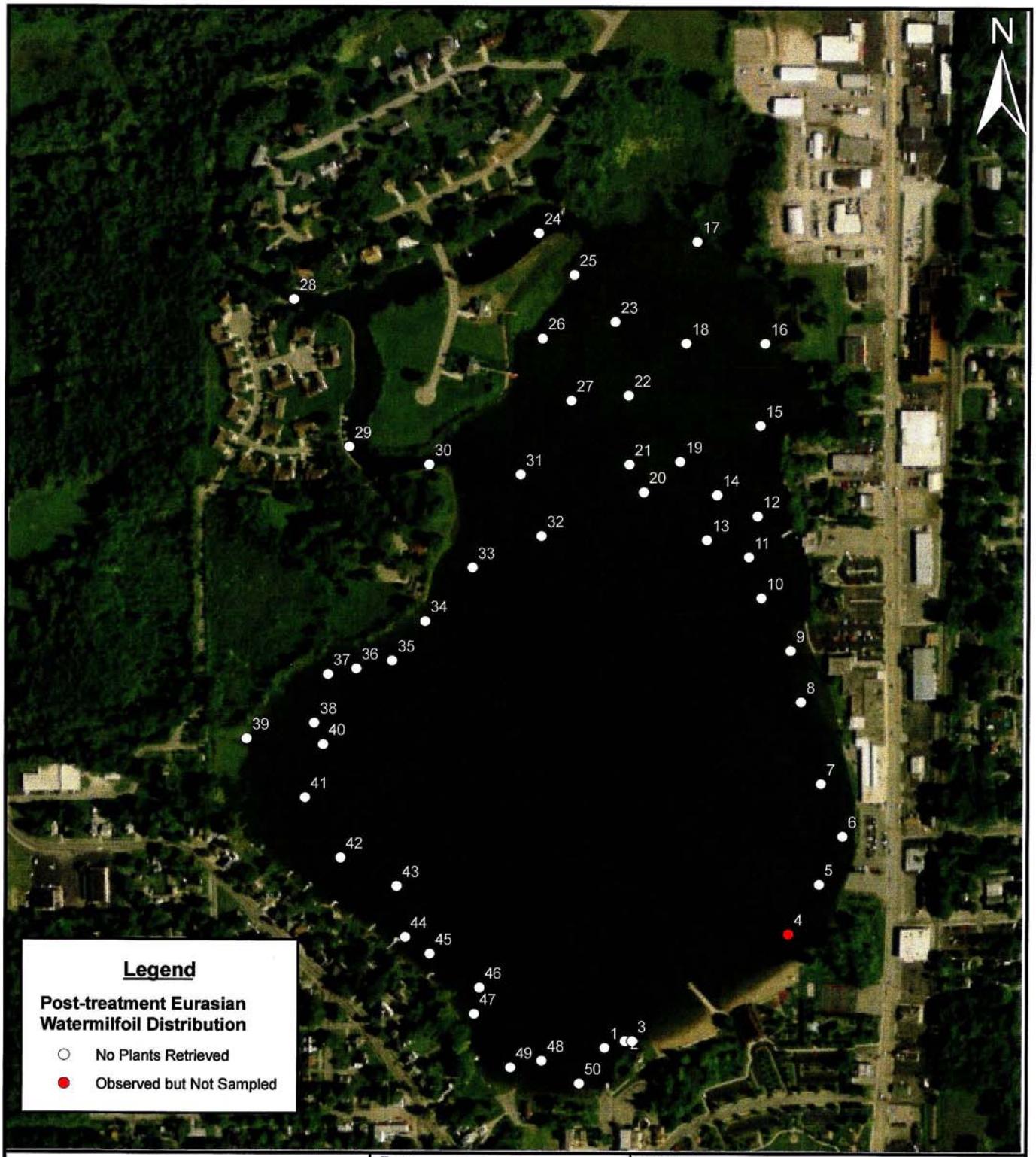
The Tier II survey completed on July 25, 2007 identified a total of 10 species within Center Lake. Vegetation was present up to a maximum depth of 7 feet. A secchi disk reading was taken after sampling and was found to be at 4 feet. Results of the sampling are listed in Table 2.

Table 2: Occurrence and abundance of aquatic plants in Center Lake on July 25, 2007.

County: Kosciusko	Total Sites: 50
Date: 7/25/2007	Sites with plants: 21
Secchi (ft): 4	Sites with native species: 21
Maximum plant depth (ft): 7	Number of species collected: 7
Trophic status: Oligotrophic	Number of species observed: 3
Trophic status sampled: Eutrophic	Number of native species: 9
	Maximum species/site: 4

All depths (0 to 15 ft)		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
Sago pondweed	*Potamogeton pectinatus*	20.0	76.0	18.0	2.0	0.0	2.7
Coontail	*Ceratophyllum demersum*	20.0	80.0	14.0	2.0	4.0	4.4
Chara	*Chara spp.*	12.0	88.0	10.0	2.0	0.0	1.8
Variable pondweed	*Potamogeton gramineus*	2.0	98.0	0.0	2.0	0.0	0.7
Illinois pondweed	*Potamogeton illinoensis*	2.0	98.0	2.0	0.0	0.0	0.2
Yellow pond lily	*Nuphar variagetum*	2.0	96.0	0.0	2.0	0.0	0.7
Spiny naiad	*Najas marina*	2.0	98.0	2.0	0.0	0.0	0.2
Depth: 0 to 5 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Sago pondweed	*Potamogeton pectinatus*	39.0	52.0	35.0	4.0	0.0	9.6
Coontail	*Ceratophyllum demersum*	21.0	79.0	17.0	0.0	4.0	7.8
Chara	*Chara spp.*	26.0	74.0	22.0	4.0	0.0	7.0
Variable pondweed	*Potamogeton gramineus*	4.0	96.0	0.0	4.0	0.0	2.6
Illinois pondweed	*Potamogeton illinoensis*	4.0	96.0	4.0	0.0	0.0	0.9
Yellow pond lily	*Nuphar variagetum*	4.0	92.0	0.0	4.0	0.0	2.6
Spiny naiad	*Najas marina*	4.0	96.0	4.0	0.0	0.0	0.9
Depth: 5 to 10 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Sago pondweed	*Potamogeton pectinatus*	6.0	94.0	6.0	0.0	0.0	1.2
Coontail	*Ceratophyllum demersum*	30.0	70.0	18.0	6.0	6.0	12.9
Depth: 10 to 15 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
**No species were found in this depth range.*							

Seven species were collected during the Tier II survey. Coontail (*Ceratophyllum demersum*) and sago pondweed (*Potamogeton pectinatus*) were present at the highest percentage of sample sites (20%). Chara ranked second in frequency of occurrence (12%). Variable pondweed (*Potamogeton gramineus*), Illinois pondweed (*Potamogeton illinoensis*), yellow pond lily (*Nuphar variagetum*), and spiny naiad (*Najas marina*) were also collected but found at a small percentage of sites (2%). Species observed within the vicinity of the sampling locations include white water lily (*Nymphaea tuberosa*), common bladderwort (*Utricularia vulgaris*), and Eurasian watermilfoil. Location of Eurasian watermilfoil is illustrated in Exhibit IV. Datasheets from V3's sampling effort are located in Appendix I.



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TITLE: Post-treatment Eurasian Watermilfoil Distribution and Abundance	PROJECT: Center Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 02218.03	EXHIBIT: IV	SHEET: 1 OF: 1
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=6500'

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Aquatic Vegetation Sampling Discussion

The goals of the plan are to reduce nuisance conditions caused by invasive plant species while still maintaining the abundance of beneficial native species. A diverse native plant community is vital in providing proper fish habitat, shoreline stabilization, and preventing the spread and/or establishment of invasive species such as Eurasian watermilfoil. Quantitative sampling of the aquatic plant community was conducted in 2004 by Weed Patrol, Inc. (Weed Patrol 2005), in 2005 by the IDNR (Benson 2006), and in 2006 and 2007 by V3. Although the sampling methods varied through the years, a summary of sampling data is provided in Table 3.

Table 3. Tier II Data Comparison from 2004 to 2007

Sampling Date:	7/25/07	07/31/06	8/02/05*	5/11/05*	8/24/04**
Secchi (ft):	4	5	5	5	18‡
# of Sites:	50	50	60	60	41
Max Plant Depth (ft):	7	8	9.5	13	14
Sites with Plants (%):	42%	74%	85%	92%	73%
# of Species:	10	15	10	10	9
# of Native Species:	9	13	8	8	7

*Data from IDNR (Benson 2006)

**Data from Weed Patrol, Inc. (Weed Patrol 2005)

‡ Assumed to be incorrect measurement, since no other value higher than 7.2 was recorded from 1991-2007.

The 2007 secchi disk reading remained consistent with the average values of the past five surveys. However, the maximum depth of plants was reported to be 14 feet in 2004, whereas aquatic plants were recorded up to a depth of only 7 feet in 2007. The 2007 sampling effort had vegetation at 42% of sites which is the lowest of all surveys. Native plants accounted for 90% of species collected. Only one exotic species was observed within Center Lake, Eurasian watermilfoil. No new problem areas interfering with lake uses were identified during Tier II sampling. Continued management efforts to maintain the Eurasian watermilfoil population at a low level is desirable to prevent Eurasian watermilfoil from becoming the predominant species in the lake.

The depth class from 5-10 feet was dominated by coontail (30%). Coontail increased from 2% occurrence of sampling sites in 2006 to 20% occurrence of sampling sites in 2007. Eurasian watermilfoil tolerates lower light conditions which gives this species a competitive advantage for growth in deeper areas. It is important to monitor and document the deeper plant bed since a lack of coontail in this area could allow for Eurasian watermilfoil populations to establish.

Aquatic Plant Management Alternatives

At the present time, the health of Center Lake's aquatic plant communities is fair. Native plant diversity is moderate. Continued management efforts to maintain the Eurasian watermilfoil population at a low level is desirable to prevent Eurasian watermilfoil from becoming the predominant species in the lake. Additionally, watershed activities to improve the water quality of Center Lake are important to enhance the native plant diversity and restore a coontail-dominated deeper bed.

Many management strategies have been used to control Eurasian watermilfoil in Indiana lakes. A management strategy should be chosen based on its selectivity to the target species, it long-term effectiveness, and potential for detrimental side-effects (i.e., effects on non-target species). The foremost objective is to choose a management strategy that will effectively control the watermilfoil population with minimal negative effects on non-target plants or fish species.

Although dense beds of native aquatic plants can be a nuisance where they inhibit lake access, aquatic vegetation is important to maintaining a healthy lake ecosystem. Aquatic plants provide habitat for plankton, insects, crustaceans, fish, and amphibians. They take nutrients like phosphorus and nitrogen out of the water column, increase water clarity, prevent harmful algal blooms, produce oxygen and provide food for waterfowl. Aquatic plants can even remove pollutants from contaminated water and prevent the suspension of particulate matter by stabilizing sediment and preventing erosion from wave action or current.

Because of the overall importance of beneficial aquatic vegetation, one of the most basic goals of the LARE aquatic vegetation program is to maintain healthy aquatic ecosystems by maintaining or improving biodiversity in Indiana lakes, which includes protecting beneficial aquatic vegetation. As such, it is recognized that competing uses of the lakes including access for boating and maintaining plant beds to provide habitat for juvenile fish must be incorporated into an overall management strategy for the lake.

Different types of aquatic plant management alternatives are discussed below. One or more of these alternatives may be employed to meet the objectives of Center Lake.

1 No Action

If no action is taken, the Eurasian watermilfoil abundance may remain stable, or it may increase from year to year. Eurasian watermilfoil spreads by fragmentation; when the plant is cut, the fragment has the ability to form an entirely new plant. Eurasian watermilfoil also over-winters as an adult plant and sprouts early in the spring. A major goal of this aquatic plant management plan is to prevent Eurasian watermilfoil from becoming a monoculture, and to maintain and enhance the current diversity of native aquatic plants. Therefore, it is imperative that Eurasian watermilfoil be controlled. Eurasian watermilfoil has a history of coming back after treatments, and diligent treatment of re-sprouts over several years is needed to provide long-term control. Taking no action might allow the Eurasian watermilfoil population to re-sprout after the 2007 and 2008 treatments and again expand to a problematic level.

2 Institutional Protection of Beneficial Vegetation

Lake users can play an important role in the protection of beneficial aquatic vegetation. Aquatic invasive species often gain a foothold in an ecosystem in areas disturbed by human activity or natural processes. In many cases, boating may be restricted in certain areas of a lake to prevent harm to native plants, especially many emergent species. Boating lanes may be established through important aquatic plant beds, and protected ecological zones may be created to prevent erosion of shoreline vegetation caused by intense wave action from boating activities. Shallow areas of a lake may also be marked with buoys to prevent injury to boaters. There currently are no boating restricted areas with the specific intent of protecting beneficial plant areas. However, the lakewide speed limit effectively minimizes wave action due to wakes, and protects beneficial vegetation, such as the emergent wetland shoreline in the northeastern portion of the lake.

3 Environmental Manipulation

Draw down of the lake water level is one option that may decrease the Eurasian watermilfoil population. Lower water levels expose the Eurasian watermilfoil roots to freezing and thawing, which may kill milfoil root systems. However, a lake drawdown will not only kill Eurasian watermilfoil but all native plants as well. Also, reducing the lake level may make new areas of the lake available for vegetative growth, and Eurasian watermilfoil may have an advantage in the colonization of these new areas.

4 Nutrient Reduction

An overabundance of nutrients can greatly increase the possibility that an invasive species will proliferate in a body of water. Limiting factors for plant growth include light, lake morphometry and depth, substrate, and the availability of nutrients like phosphorus and nitrogen. While lake morphometry is most highly correlated with plant biomass, the availability of phosphorus and nitrogen have a significant impact on the amount of plant growth in a body of water. If the vast majority of phosphorus in a system is tied up in plant matter, it may be difficult for an invasive species to become established and spread rapidly in a lake. If phosphorus is constantly being added to the system and is readily available in the water, invasive species can use the nutrient excess and take over an aquatic system within a few growing seasons. Additionally, herbicide applications to native plant beds can cause a single large release of nutrients as the killed vegetation decomposes, coupled with available space for the germination of new species. This combination of conditions presents a ripe opportunity for the establishment of an invasive species such as Eurasian watermilfoil.

Phosphorus and nitrogen are added to aquatic systems by many natural sources, such as the decomposition of plant material and animal waste. Human activity, however, is often responsible for excessive phosphorus loading that contributes to blue-green algal blooms, overabundant vegetation growth, and a general decline in water quality. Major contributions of excess phosphorus come from sources such as septic system inputs, agricultural runoff, storm water drainage, lawn fertilizer applications, and improper disposal of grass clippings and tree leaves. Owners of lake front property can reduce the amount of phosphorus entering the lake by taking actions. In addition, implementation of best management practices throughout the watershed, such as filter strips, no till agriculture, wetland preservation or restoration, and streambank stabilization, would reduce the sediment and nutrient inputs into the lake, improve water quality, and lessen conditions that favor invasive species.

5 Mechanical Cutting and Harvesting

Mechanical harvesting involves using a large machine to cut and collect unwanted aquatic plants. The machine picks up the cut weeds but leaves small fragments behind. Since Eurasian watermilfoil is able to reproduce from cut fragments, mechanical harvesting can spread this invasive species. Additionally, mechanical harvesting is not selective and will cut both native and exotic plant species. Where both are growing together, mechanical harvesting will give an advantage to Eurasian watermilfoil over any native species that are present, given its growth and reproductive characteristics. Each fragment clipping of Eurasian watermilfoil is capable of becoming reestablished as a complete plant. For these reasons, mechanical harvesting is not recommended in any area inhabited by Eurasian watermilfoil. Harvesting can be accomplished by individual owners around their dock areas. A lake property owner can legally harvest a 625 square foot area (25 feet by 25 feet).

6 Hand-Pulling, Cutting, Raking

Manual controls such as hand pulling, cutting, and raking can be effective ways to control unwanted plants in certain situations. In very shallow clear water, small areas of vegetation can be identified and cleared by hand. Large areas of vegetation, especially those in deeper water, can be extremely difficult to control using these methods. Many of the harvested weeds will break apart, leaving the root system in the lake bottom. Failure to remove root structures will result in re-growth.

Plants such as Eurasian watermilfoil that possess the ability to reproduce through fragmentation can seldom be effectively controlled by these methods if they are distributed throughout a lake. Identifying every area of infestation would be difficult, as would harvesting the plants without causing fragmentation of plant parts. Any plant fragments not removed from the water can form new plants, meaning that hand pulling and cutting can facilitate the spread of unwanted plant species such as Eurasian watermilfoil. The infestation of Eurasian watermilfoil has been too large in recent years, and shown too high a potential for expansion for hand-pulling, cutting, or raking to be viable options.

7 Bottom Barriers

Bottom barriers prevent the growth of aquatic plants by lining the bottom of a lake or pond with a material that prohibits light from reaching the lake bottom, which is difficult for plants to penetrate. Often plastic or concrete barriers are installed during construction of a lake or pond to prevent subsequent growth of aquatic vegetation. This form of control is best implemented during construction of a new pond or lake. Placing a bottom barrier in an existing lake would involve significant logistical challenges and would be extremely expensive. A draw down of the lake may be necessary to install the barrier. Once in place, the barrier would prevent plant growth of both invasive and native species, and would deprive the lake ecosystem of the benefits provided by native aquatic plants. Sediment would gradually accumulate on top of the barrier, and aquatic plant growth would return as plants begin to take root in the sediment on top of the barrier; bottom barriers generally do not provide effective long-term control. Bottom barriers may not be placed without a permit for shoreline construction from the IDNR Division of Water.

8 Biological Controls – Water Milfoil Weevil

The water milfoil weevil is a native North American insect that consumes Eurasian watermilfoil and northern milfoil. The milfoil weevil burrows into the stem and consumes tissue of the plant. Holes in the milfoil stem bored by weevil larvae allow disease an entrance pathway. These same holes also cause a release of the plant's gases, which reduces buoyancy and causes the plant to sink. All biological controls, including water milfoil weevil stocking, may not be implemented without an aquatic plant control permit from the IDNR Division of Fish & Wildlife.

Studies conducted to evaluate the effectiveness of the water milfoil weevil have not yielded consistent results. Factors influencing the weevil's success or failure in a body of water are not well documented. In 2003, Scribailo and Alix conducted a weevil test on Round Lake in Indiana and found no conclusive evidence that the Eurasian watermilfoil populations were reduced, and past efforts to control Eurasian watermilfoil at Center Lake were ineffective. In addition to this potential ineffectiveness, a large population of Eurasian watermilfoil must be present to support the weevil population. For both of these reasons, using the water milfoil weevil as a biological control agent for Eurasian watermilfoil is not recommended at Center Lake.

9 Biological Controls – Grass Carp

The Asian grass carp (*Ctenopharyngodon idella*) is an herbivorous fish that is native to eastern Russia and China. This fish has been introduced into the U.S. to help control aquatic vegetation. To prevent their uncontrolled proliferation, all fish stocked in Indiana must be triploid, meaning that they are sterile and cannot reproduce. Stocking is restricted to privately owned bodies of water, and suppliers must obtain a special permit from the IDNR. All biological controls, including grass carp stocking, may not be implemented without an aquatic plant control permit from the IDNR Division of Fish & Wildlife.

Grass carp are completely vegetarian, feeding on many species of submersed plants, in addition to some floating plants such as duckweed. Hydrilla, a highly invasive plant found in many southern states, is a preferred food of grass carp, and efforts to control hydrilla with grass carp have been successful. However, grass carp avoid Eurasian watermilfoil and show strong preferences for many native plants in addition to hydrilla. Therefore, when Eurasian watermilfoil occurs with native plant populations, grass carp are not recommended.

10 Chemical Controls – Aquatic Herbicides

There are two major categories of aquatic herbicides: contact and systemic herbicides. Contact herbicides are not selective, and thus are best used to control plants around piers and in navigation channels. Given the lack of selectivity and their inability to eliminate the root systems of treated plants, contact herbicides have the potential to cause unnecessary damage to native species. Additionally, there is potential for re-infestation of Eurasian watermilfoil. Reward (active ingredient: diquat) and Aquathal (active ingredient: endothal) are two examples of contact herbicides.

Although contact herbicides generally are not selective, timing and dosage can be adjusted to make them affect the target species with less damage to non-target species. The phenological timing method of contact herbicide treatment for Eurasian watermilfoil has shown some success. Recent tests have shown that by adjusting the dosage higher and timing the treatment exactly, a systemic effect on Eurasian watermilfoil can be achieved with contact herbicides. This method involves treating the plants very early in the spring when carbohydrate reserves of Eurasian watermilfoil have left the root structure, promoting rapid growth in the other plant structures. Since Eurasian watermilfoil is growing more actively earlier in the spring than other species, the risk to non-target plants is relatively low if timed properly.

The contact herbicide commonly used for selective low-dose control of Eurasian watermilfoil in mid-season is Reward. A low-dose contact herbicide application can be relatively selective, since Eurasian watermilfoil is susceptible to some herbicides at a dose lower than most native plants due to their high growth rate. As a complicating factor, low-dose applications to control Eurasian watermilfoil with Reward are difficult in lakes where high levels of single-cell algae are present. Reward's mode of action is that it binds with positively charged particles in the water column. Since single-cell algae are positively charged, Reward will bind with algae in the water column and not affect the milfoil. Although Reward is not marketed as an algaecide, alga is

shown on the label as controlled by this product. Since alga is moderately abundant during mid-summer at Center Lake, the effectiveness of a low-dose contact treatment may be compromised.

Systemic herbicides are absorbed by the plant and transported to the root systems where they kill both the roots and the plant. Examples of systemic herbicides are Sonar and Avast (active ingredient: fluridone); Navigate, Aqua Kleen, DMA4 (active ingredient: 2,4-D), and Renovate (active ingredient: triclopyr). All of these products effectively kill Eurasian watermilfoil plants and roots. Whole lake treatments of fluridone are often used in lakes that have become severely infested with Eurasian watermilfoil. Fluridone can be applied at low rates to control the Eurasian watermilfoil while causing minimal damage to most of the native plant species present. Curly-leaf pondweed is also susceptible to fluridone at the low dose used on Eurasian watermilfoil.

Triclopyr and 2,4-D are both systemic herbicides that are often used for spot treatments in small areas of Eurasian watermilfoil. These herbicides kill all dicots (broadleaf plants such as coontail, waterweed, watermilfoils, etc.) but do not affect monocots (such as eel grass or pondweeds). In preliminary studies, triclopyr may have the ability to control Eurasian watermilfoil in select areas longer than 2,4-D, but this potential benefit is outweighed by higher cost. Neither chemical affects curly-leaf pondweed.

The public's primary concern with the use of aquatic herbicides is safety. Each chemical registered for aquatic applications has undergone extensive testing prior to becoming available for use. It is imperative that any aquatic herbicide be applied by a licensed professional in accordance with its label to minimize potential side-effects.

2007 Vegetation Control

Weed Patrol performed a Renovate 2,4-D treatment herbicide application for Eurasian watermilfoil on May 17, 2007 for 4 acres and again on August 1, 2007 for .75 acres. Weed Patrol also treated curlyleaf pondweed on May 17, 2007 for 1.75 acres. Center Lake's channels were treated with Renovate 2,4-D which was applied on May 17, 2007. Total acreage for channel treatments includes 1 acre for Eurasian watermilfoil and 1.25 acres for curlyleaf pondweed (Exhibit II). Eurasian watermilfoil was present at less than 1% of sampling locations. It was recorded within the vicinity of sampling station four at a depth of 6 feet. Our study's results compared with past surveys indicate the treatment was effective in reducing densities of Eurasian watermilfoil and was the lowest recorded occurrence in three years.

There are no known state or federally protected threatened or endangered species present within Center Lake. No voucher specimens were collected during the efforts of this project. There are no anticipated adverse impacts to any state or federally protected threatened or endangered species as it relates to the use of the vegetation control herbicides recommended within this plan.

Public Involvement

Public meeting have been held annually by the Center Lake Conservation Association to discuss the vegetation management plan. A notice of the public meeting was published in the newspaper, and the public input was requested on proposed aspects of the aquatic plant management plan. A public meeting was held November 27, 2007 at the Warsaw Community Library in Warsaw, Indiana. Twenty individuals attended the meeting. V3 discussed current plant management activities, results of the Tier II survey, and future management. A lake use survey was handed out after the meeting and ten individuals participated. Summary totals from the completed lake use survey are shown in Figure 1. Ninety percent of participants were lake property owners and all were current members of the Center Lake Conservation Association. Fifty percent of lake property owners had been at the lake for 10 years or more. Forty percent had been at the lake from 5 to 10 years and the remaining 10% had been at the lake for 2 to 5 years. Questions concerning lake use found that 90% of those surveyed used the lake for boating, 80% for irrigation and fishing, and 40% for swimming. Nobody surveyed used the lake for drinking water. Questions concerning problems with the lake found that 100% thought dredging was needed, 80% felt there are too many aquatic plants, and 30% believed there is poor water quality. There were no other problems recorded for the lake. All of those surveyed were in favor of continuing efforts to control vegetation and were aware of LARE contributions for controlling invasive exotic species. All survey participants felt aquatic vegetation interfered with lake use, affected property values, and were aware of current weed control projects on Center Lake. Original survey sheets are located in Appendix I.

Lake residents play an important role in establishing and maintaining a healthy lake community. Lake association meetings and newsletters are excellent mechanisms through which information about management practices at Center Lake can be distributed. In addition, these meetings provide a forum where issues regarding conflicting uses and goals for the lake may be discussed and keep the public informed of lake issues.

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes 9 No 1

Are you currently a member of your lake association? Yes 10 No 0

How many years have you been at the lake?

2 or less	0
2-5 years	1
5-10 years	4
Over 10 years	5

How do you use the lake (mark all that apply)

4 Swimming	8 Irrigation
9 Boating	0 Drinking water
8 Fishing	1 Other_____

Do you have aquatic plants at your shoreline in nuisance quantities?	Yes 7	No 2
Do you currently participate in a weed control project on the lake?	Yes 10	No 0
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes 10	No 0
Does the level of vegetation in the lake affect your property values?	Yes 10	No 0
Are you in favor of continuing efforts to control vegetation on the lake?	Yes 10	No 0
Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded?	Yes 10	No 0

Mark any of these you think are problems on your lake:

0	Too many boats access the lake
0	Use of jet skis on the lake
0	Too much fishing
0	Fish population problem
10	Dredging needed
0	Overuse by nonresidents
8	Too many aquatic plants
0	Not enough aquatic plants
3	Poor water quality
0	Pier/funneling problem

Please add any comments:

_____

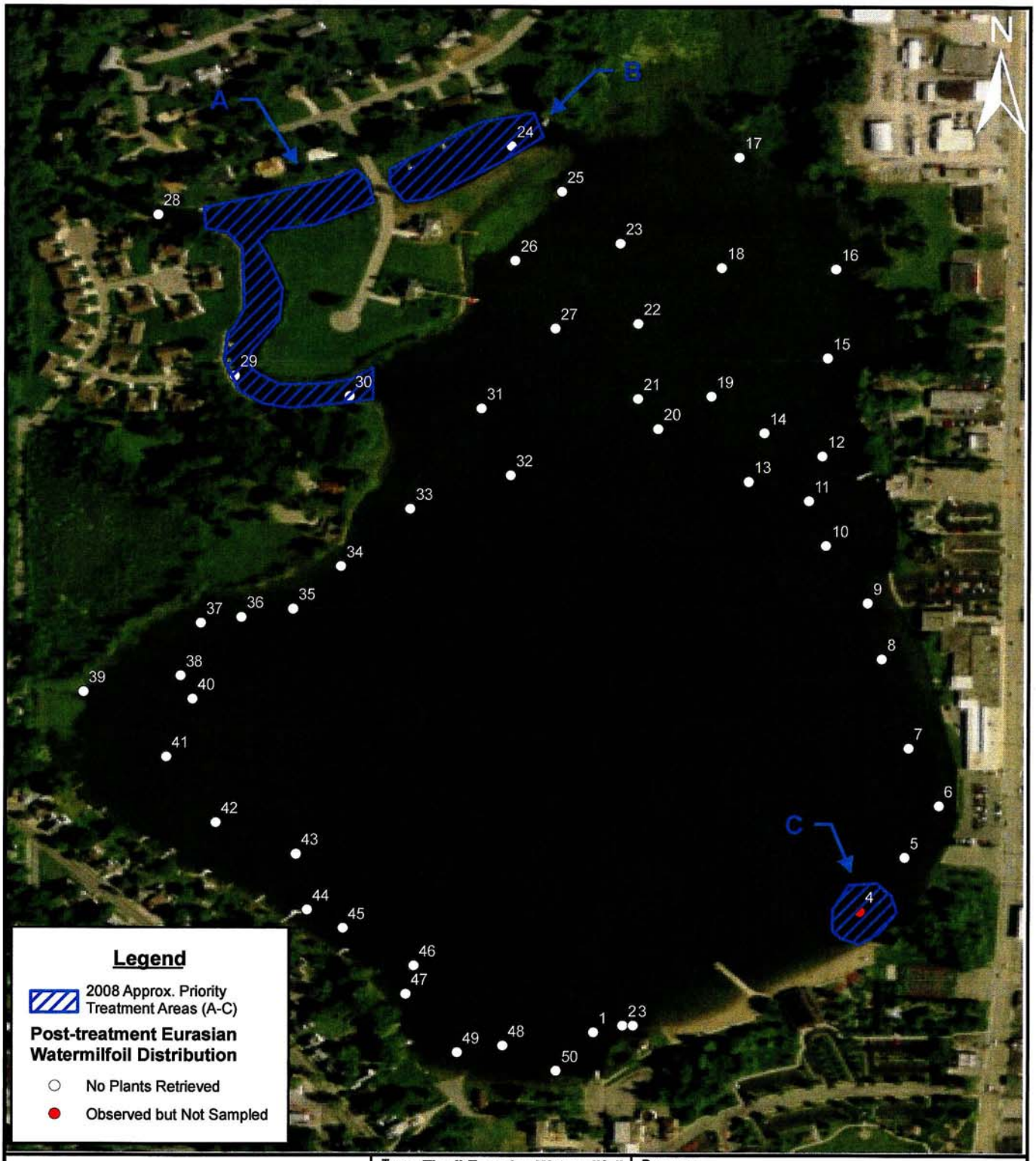
_____

Figure 1. Summary totals from completed Lake Use Survey Forms.

Action Plan

V3 identified three approximate priority treatment areas for 2008 based on the results of the post treatment aquatic vegetation survey (Exhibit V). A total of five acres are requested for treatment in 2008. Priority treatment areas location and acreage are described with the Application for Aquatic Vegetation Control Permit located in Appendix II.

As the action plan is implemented, aquatic plant surveys will help to monitor the effectiveness of the management strategy. The abundance distribution of Eurasian watermilfoil will be recorded using the current IDNR Tier II sampling protocol. After the Spring 2008 Target Species Distribution Map is created, the distribution and abundance of Eurasian watermilfoil will be identified and treatment maps will be prepared. The survey will also document whether native plants have re-colonized areas of previous Eurasian watermilfoil infestation. The new data analysis results will be incorporated into the current lake management plan. This will provide property owners, applicators, and the IDNR with detailed records describing the changes within the plant communities of Center Lake. In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic plant beds are reacting to any treatment. These surveys will provide a basis for evaluation of the management strategy and can be presented to the public should the management strategy need to be modified. They will also serve to keep the public informed about management practices at the lake so they will be motivated and educated to actively participate in conservation of the Center Lake ecosystem.



V3 Companies
7325 Janes Avenue
Woodridge, IL 60517
630.724.9200 phone
630.724.9202 fax
www.v3co.com

TITLE: **Tier II Eurasian Watermilfoil Results with Approximate Treatment Areas for 2008**	PROJECT: **Center Lake Aquatic Plant Management Plan**		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 02218.03	EXHIBIT: V	SHEET: 1 OF: 1
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=6000'

E:\2002\02218\02218.03\Reports\Natural Resources\Wetland\Exhibits\Eurasian Priority Treatment 2008.mxd

Implementation of Action Plan

1. Spring 2008 Target Species Distribution Map, and Proposed Treatment Area Map. The site visit and investigation necessary to create these two maps will allow for the determination of the extent of follow-up chemical treatment that will be necessary to treat Eurasian watermilfoil. As of July, the 2007 chemical treatment effectively reduced the Eurasian watermilfoil population. The Spring 2008 mapping will determine the extent and location of milfoil re-growth.

2. Follow-up Herbicide Treatment to Eurasian watermilfoil. An early spring (3rd week of April to mid-May) systemic herbicide application of 2,4-D is proposed during 2008 to treat the Eurasian watermilfoil that has re-grown since the 2007 herbicide application.

3. Summer 2008 Tier II Aquatic Plant Survey. A Tier II aquatic plant survey should be conducted during the Summer 2008 to document the diversity, distribution and abundance of aquatic plants. This data is important to ensure that the native plant community is protected, and that the Eurasian watermilfoil population is kept under control.

The management goal for 2008 is to keep the Eurasian watermilfoil populations below nuisance quantities. The overall goal for Center Lake is the results of the 2008 sampling are equal to or less than the 2007 Eurasian watermilfoil density and abundance which would demonstrate effective herbicide treatments and management.

Budget Update

The following costs are estimated based on lake size, average depth, chemical and application costs, as well as LARE survey requirements. In an attempt to assist LARE staff with alternatives in the event of grant funding limitations, the implementation of the 2007 Herbicide Application and Tier II survey is of a higher priority than the 2008 Tier II survey. The proposed management schedule and budgets for 2008 and 2009 are summarized below.

2008

Target Species Distribution Map and Proposed Treatment Area Map	$1,000
Early Spring Systemic Herbicide Application of 2,4-D, Renovate or Aquathol K (up to 5 acres of Eurasian watermilfoil or up to 16 acres of curlyleaf pondweed)	$2,000
Late season post treatment aquatic plant survey (Tier II) and plan update	$5,000

2009

Target Species Distribution Map and Proposed Treatment Area Map	$1,000
Late season (post treatment) aquatic plant survey (Tier II) and plan update	$5,000

Any herbicide applications will depend on the results of the surveys. Sources for future funding of Aquatic Plant Management Plans are located in Appendix III.

These management activities and plant surveys are proposed to improve Center Lake's ecosystem and facilitate the achievement of overall goals established by the IDNR. These overall goals established by the IDNR for all lakes applying for LARE funding are: 1) develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality, and is resistant to minor habitat disturbances and invasive species; 2) direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species; and 3) provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

Monitoring and Plan Updates

As the action plan is implemented, aquatic plant surveys will help to monitor the effectiveness of the management strategy. The abundance distribution of Eurasian watermilfoil will be recorded using the current IDNR Tier II sampling protocol.

The results of the 2007 post-treatment sampling reflect progress toward the goals stated in the 5 year plan. Coontail, sago pondweed, and Chara, all native species, accounted for the three most dominant species within Center Lake. Native species accounted for 90% of the aquatic plants collected. There was only one location where Eurasian watermilfoil was found within the vicinity of a sampling location. There were no species found within the 10-15 foot depth zone and should monitored within the following years to ensure Eurasian watermilfoil doesn't establish.

After the Spring 2008 Target Species Distribution Map is created, the distribution and abundance of Eurasian watermilfoil will be identified and treatment maps will be prepared. The survey will also document whether native plants have re-colonized areas of previous Eurasian watermilfoil infestation. The new data analysis results will be incorporated into the current lake management plan. This will provide property owners, applicators, and the IDNR with detailed records describing the changed in the plant community of Center Lake.

In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic plant beds are reacting to any treatment regimes. These surveys will provide a basis for evaluation of the management strategy and can be presented to the public should the management strategy need to be modified. They will also serve to keep the public informed about management practices at the lake so they will be motivated and educated to actively participate in conservation of the Center Lake ecosystem.

References

Benson, A.C. 2006. Center Lake, Kosciusko County, 2005 Fish Management Report. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, IN.

Scribailo, R.W. and M.S. Alix. 2003. Final Report on the Weevil Release Study for Indiana Lakes. Department of Botany and Plant Pathology. Purdue University, West Lafayette, IN.

V3 Consultants, Ltd. 2005. Center Lake Watershed Diagnostic Study. Woodridge, IL.

Weed Patrol, Inc. 2005. Center Lake Aquatic Plant Management Plan 2005 – 2008. Warsaw, IN.

Appendices

Appendix I- Data Sheets, Tier II Latitude/Longitude, and Survey Questionnaires
Appendix II- Vegetation Control Permit
Appendix III- Resources for Aquatic Vegetation Management

APPENDIX I

DATA SHEETS, TIER II LATITUDE/LONGITUDE AND SURVEY QUESTIONNAIRES

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization: V3 Companies

Contact Information: Ed Belmonte (630) 729-6160

Waterbody Name: Center Lake

Lake ID: 02218

County(s): Kosciusko

Date: 7-25-07

Habitat Stratum: IL

Avg. Lake Depth (ft):

Lake Level:

Crew Leader: Walter Levernier

GPS Metadata

Datum:

Zone: 16

Accuracy:

Recorder: Jessica Dunn

Method:

Secchi Depth (ft):

Total # of Points Surveyed: 50

Total # of Species: 10

Littoral Zone Size (acres):

- ☐ Measured
- ☐ Estimated

Littoral Zone Max. Depth (ft):

- ☐ Measured
- ☐ Estimate (historical Secchi)
- ☐ Estimated (current Secchi)

Notable Conditions:

DO-9.78
Temp- 25.9°C

* Suspect herbicide treatment as cause of the dead sago pondweed at North side of lake

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Center Lake	DATE: 07.25.2007
COUNTY: Kosciusko	SECCHI DEPTH (FT): 4
SITE ID: 02218	MAX PLANT DEPTH (FT):
SURVEYING ORGANIZATION: V3 Companies	WEATHER: Partly Sunny
CREW LEADER: Walter Levernier	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Jessica Dunn	
CONTACT INFO:	Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

GPS #	Point #	R/T	Latitude	Longitude	Depth	POTPEC	CERDEM	CHARA	~~ALGA~~	MYRSPI	~~POTCRI~~	POTGRA	POTILL	Notes
110	1	R			11'									no veg
111	2	R			6'		3							
112	3	R			3	3	7	1				3		
113	4	R			6'		5			9				
114	5	R			9'									no veg
115	6	R			4'	1	5							
116	7	R			14'									no veg
117	8	R			7									no veg
118	9	R			4			1					1	
119	10	R			11'									no veg
120	11	R			6'		1							
121	12	R			4'									no veg
122	13	R			11'									no veg
123	14	R			6'									no veg
124	15	R			3'	1								no veg (dead POTPEC)
125	16	R			2'	1								NUPVAR-3
126	17	R			2	1		1						
127	18	R			3'	1								no veg (dead potpec)
128	19	R			6'									no veg
129	20	R			13'									no veg
130	21	R			6'									no veg
131	22	R			3	1								no veg (dead potpec)
132	23	R			3'	1								no veg (dead potpec)
133	24	R			4'									NYMTUB-9
134	25	R			2'	1								NYMTUB-9 (dead potpec)
135	26	R			2'									no veg
136	27	R			3									no veg
137	28	R			3'		1							UTRVUL-9
138	29	R			4'		1							NYMTUB-9; UTRVUL-9
139	30	R			4'		1							NYMTUB-9, UTRVUL-9
140	31	R			7'									no veg
141	32	R			11									no veg
142	33	R			7'	1	1							(dead POTPEC)

Other plant species observed at lake:

120 acre, Oligotrophic

0-5
卌 卌 卌 卌

5-10
卌 卌 ||||

10-15
卌 |||

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Center Lake
COUNTY: Kosciusko
SITE ID:
SURVEYING ORGANIZATION: Vcompanies
CREW LEADER: Walter Levesnier
RECORDER: Jessica Dunn
CONTACT INFO:

DATE: 7 25 2007
SECCHI DEPTH (FT):
MAX PLANT DEPTH (FT):
WEATHER: Partly Cloudy
COMMENTS (Include voucher codes - V1, V2...):

Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

	Point #	R/T	Latitude	Longitude	Depth	Species Codes: POTPEC	CERDEM	CHARA	~~ALGA~~	MYRSP1	~~POTERI~~	POTGRA	POTILL	Notes
143	34	R			4			1						
144	35	R			17									no veg
145	36	R			9									no veg
146	37	R			4									no veg
147	38	R			8									no veg
148	39	R			2									NYMTUB-9, NUPVAR-1
149	40	R			11									no veg
150	41	R			8									no veg
151	42	R			7									no veg
152	43	R			15									no veg
153	44	R			3			3						NYMTUB-9, NASMAR-9
154	45	R			9									no veg
155	46	R			12									no veg
156	47	R			16	1	1							
159	48	R			4	9		1						
160?	49	R			8									no veg
161	50	R			4	9								no veg NYMTUB-9

Other plant species observed at lake:

Center Lake Aquatic Plant Management Plan Update-2007
Tier II Sampling, July 2007

Tier II Sampling Location Number	Latitude	Longitude
1	41.24266	-85.85664
2	41.24273	-85.85635
3	41.24273	-85.85625
4	41.24386	-85.85402
5	41.24439	-85.85358
6	41.2449	-85.85324
7	41.24547	-85.85354
8	41.24635	-85.85381
9	41.2469	-85.85395
10	41.24747	-85.85436
11	41.24791	-85.85453
12	41.24835	-85.8544
13	41.2481	-85.85512
14	41.24858	-85.85497
15	41.24932	-85.85435
16	41.2502	-85.85427
17	41.2513	-85.85522
18	41.25021	-85.85539
19	41.24894	-85.85549
20	41.24862	-85.85601
21	41.24892	-85.85621
22	41.24966	-85.85621
23	41.25045	-85.85639
24	41.25141	-85.85747
25	41.25096	-85.85697

Tier II Sampling Location Number	Latitude	Longitude
26	41.25028	-85.85743
27	41.24961	-85.85703
28	41.25073	-85.86095
29	41.24914	-85.86019
30	41.24894	-85.85906
31	41.24882	-85.85776
32	41.24816	-85.85747
33	41.24783	-85.85846
34	41.24726	-85.85914
35	41.24684	-85.85961
36	41.24676	-85.86012
37	41.2467	-85.86052
38	41.24618	-85.86072
39	41.24602	-85.86168
40	41.24595	-85.8606
41	41.24538	-85.86086
42	41.24473	-85.86037
43	41.24442	-85.85958
44	41.24387	-85.85947
45	41.24369	-85.85912
46	41.24332	-85.85842
47	41.24304	-85.8585
48	41.24253	-85.85754
49	41.24246	-85.85799
50	41.24228	-85.85701

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes____ No X

Are you currently a member of your lake association? Yes X No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ___
- Over 10 years X

How do you use the lake (mark all that apply)

- ___Swimming
- ___Boating
- X Fishing
- ___Irrigation
- ___Drinking water
- ___Other_____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes X No____

Do you currently participate in a weed control project on the lake? Yes X No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes X No____

Does the level of vegetation in the lake affect your property values? Yes X No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes X No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes X No____

Mark any of these you think are problems on your lake:

- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- X Dredging needed
- ___ Overuse by nonresidents
- X Too many aquatic plants
- ___ Not enough aquatic plants
- ___ Poor water quality
- ___ Pier/funneling problem

Please add any comments:

_____

_____

_____

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes X No____

Are you currently a member of your lake association? Yes X No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ___
- Over 10 years X

How do you use the lake (mark all that apply)
- ___Swimming
- X Boating
- X Fishing
- X Irrigation
- ___Drinking water
- ___Other_____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes X No____

Do you currently participate in a weed control project on the lake? Yes X No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes X No____

Does the level of vegetation in the lake affect your property values? Yes X No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes X No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes X No____

Mark any of these you think are problems on your lake:
- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- X Dredging needed (Channels)
- ___ Overuse by nonresidents
- X Too many aquatic plants
- ___ Not enough aquatic plants
- X Poor water quality
- ___ Pier/funneling problem

Please add any comments:

_____

_____

_____

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes ✓ No ____

Are you currently a member of your lake association? Yes ✓ No ____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ✓
- Over 10 years ___

How do you use the lake (mark all that apply)
- ✓ Swimming
- ✓ Boating
- ✓ Fishing
- ✓ Irrigation
- ___ Drinking water
- ___ Other ____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes ✓ No ____

Do you currently participate in a weed control project on the lake? Yes ✓ No ____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes ____ No ✓

Does the level of vegetation in the lake affect your property values? Yes ✓ No ____

Are you in favor of continuing efforts to control vegetation on the lake? Yes ✓ No ____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes ✓ No ____

Mark any of these you think are problems on your lake:
- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- ✓ Dredging needed
- ___ Overuse by nonresidents
- ✓ Too many aquatic plants
- ___ Not enough aquatic plants
- ___ Poor water quality
- ___ Pier/funneling problem

Please add any comments:

We are greatful for the State's programs designed to improve H_2O Quality. We are also greatful for your work, Ed and Look forward to continued partnerships.

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes ✓ No ____

Are you currently a member of your lake association? Yes ✓ No ____

How many years have you been at the lake?
- 2 or less ____
- 2-5 years ____
- 5-10 years ✓
- Over 10 years ____

How do you use the lake (mark all that apply)
- ✓ Swimming
- ✓ Boating
- ____ Fishing
- ✓ Irrigation
- ____ Drinking water
- ____ Other ____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes ✓ No ____

Do you currently participate in a weed control project on the lake? Yes ✓ No ____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes ✓ No ____

Does the level of vegetation in the lake affect your property values? Yes ✓ No ____

Are you in favor of continuing efforts to control vegetation on the lake? Yes ✓ No ____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes ✓ No ____

Mark any of these you think are problems on your lake:
- ____ Too many boats access the lake
- ____ Use of jet skis on the lake
- ____ Too much fishing
- ____ Fish population problem
- ✓ Dredging needed
- ____ Overuse by nonresidents
- ✓ Too many aquatic plants
- ____ Not enough aquatic plants
- ✓ Poor water quality
- ____ Pier/funneling problem

Please add any comments:

Channel dredging important
Lake looks much improved but eurasian milfoil is threatening to thrive along part of the shoreline again. Another weed control application is needed.

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes ✓ No____

Are you currently a member of your lake association? Yes ✓ No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ___
- Over 10 years ✓

How do you use the lake (mark all that apply)

- ___Swimming
- ✓ Boating
- ✓ Fishing
- ✓ Irrigation
- ___Drinking water
- ___Other_____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes ✓ No____

Do you currently participate in a weed control project on the lake? Yes ✓ No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes ✓ No____

Does the level of vegetation in the lake affect your property values? Yes ✓ No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes ✓ No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes ✓ No____

Mark any of these you think are problems on your lake:

- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- ✓ Dredging needed
- ___ Overuse by nonresidents
- ___ Too many aquatic plants
- ___ Not enough aquatic plants
- ___ Poor water quality
- ___ Pier/funneling problem

Please add any comments:

WE HAVE MADE WONDERFUL PROGRESS THE PAST SEVERAL YEARS. WE NEED TO KEEP MOVING FORWARD.

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes X No____

Are you currently a member of your lake association? Yes X No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years X
- Over 10 years ___

How do you use the lake (mark all that apply)

- ___Swimming
- X Boating
- X Fishing
- X Irrigation
- ___Drinking water
- ___Other_____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes X No____

Do you currently participate in a weed control project on the lake? Yes X No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes X No____

Does the level of vegetation in the lake affect your property values? Yes X No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes X No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes X No____

Mark any of these you think are problems on your lake:

- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- X Dredging needed
- ___ Overuse by nonresidents
- X Too many aquatic plants
- ___ Not enough aquatic plants
- ___ Poor water quality
- ___ Pier/funneling problem

Please add any comments:

_____

_____

_____

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes X No____

Are you currently a member of your lake association? Yes X No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ___
- Over 10 years X

How do you use the lake (mark all that apply)

- ___Swimming
- X Boating
- X Fishing
- X Irrigation
- ___Drinking water
- ___Other_____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes____ No____

Do you currently participate in a weed control project on the lake? Yes X No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes X No____

Does the level of vegetation in the lake affect your property values? Yes X No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes X No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes X No____

Mark any of these you think are problems on your lake:

- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- X Dredging needed
- ___ Overuse by nonresidents
- X Too many aquatic plants
- ___ Not enough aquatic plants
- ___ Poor water quality
- ___ Pier/funneling problem

Please add any comments:

_____

_____

_____

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Center Lake

Are you a lake property owner? Yes ✓ No ____

Are you currently a member of your lake association? Yes ✓ No ____

How many years have you been at the lake?

- 2 or less ____
- 2-5 years ✓
- 5-10 years ____
- Over 10 years ____

How do you use the lake (mark all that apply)

- ✓ Swimming
- ✓ Boating
- ✓ Fishing
- ____ Irrigation
- ____ Drinking water
- ____ Other ____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes ____ No ✓

Do you currently participate in a weed control project on the lake? Yes ✓ No ____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes ✓ No ____

Does the level of vegetation in the lake affect your property values? Yes ✓ No ____

Are you in favor of continuing efforts to control vegetation on the lake? Yes ✓ No ____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes ✓ No ____

Mark any of these you think are problems on your lake:

- ____ Too many boats access the lake
- ____ Use of jet skis on the lake
- ____ Too much fishing
- ? ____ Fish population problem
- ✓ Dredging needed
- ____ Overuse by nonresidents
- ____ Too many aquatic plants
- ____ Not enough aquatic plants
- ____ Poor water quality
- ____ Pier/funneling problem

Please add any comments:

Would like to better understand DNR monitoring + stocking plans

Alan Matthews 5742676708

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes ✓ No ____

Are you currently a member of your lake association? Yes ✓ No ____

How many years have you been at the lake?

- 2 or less ____
- 2-5 years ____
- 5-10 years ✓
- Over 10 years ____

How do you use the lake (mark all that apply)

- ____ Swimming
- ✓ Boating
- ____ Fishing
- ✓ Irrigation
- ____ Drinking water
- ____ Other ____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes ✓ No ____

Do you currently participate in a weed control project on the lake? Yes ✓ No ____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes ✓ No ____

Does the level of vegetation in the lake affect your property values? Yes ✓ No ____

Are you in favor of continuing efforts to control vegetation on the lake? Yes ✓ No ____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes ✓ No ____

Mark any of these you think are problems on your lake:

- ____ Too many boats access the lake
- ____ Use of jet skis on the lake
- ____ Too much fishing
- ____ Fish population problem
- ✓ Dredging needed
- ____ Overuse by nonresidents
- ✓ Too many aquatic plants
- ____ Not enough aquatic plants
- ____ Poor water quality
- ____ Pier/funneling problem

Please add any comments:

_____

_____

_____

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes X* No____
*City of Warsaw has parks & beaches on Center Lake

Are you currently a member of your lake association? Yes X* No____

How many years have you been at the lake?
- 2 or less ___
- 2-5 years ___
- 5-10 years ___
- Over 10 years X*

How do you use the lake (mark all that apply)
- X Swimming
- X Boating
- X Fishing
- X Irrigation
- ___ Drinking water
- X Other Maintain/manage public parks/beach at Center Lake

Do you have aquatic plants at your shoreline in nuisance quantities? Yes____ No X*
(it is more of a problem away from our shoreline)

Do you currently participate in a weed control project on the lake? Yes X No____

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes X No____

Does the level of vegetation in the lake affect your property values? Yes X No____

Are you in favor of continuing efforts to control vegetation on the lake? Yes X No____

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes X No____

Mark any of these you think are problems on your lake:
- ___ Too many boats access the lake
- ___ Use of jet skis on the lake
- ___ Too much fishing
- ___ Fish population problem
- X Dredging needed
- ___ Overuse by nonresidents
- X Too many aquatic plants
- ___ Not enough aquatic plants
- X Poor water quality
- ___ Pier/funneling problem

Please add any comments:

* I am personally not a property owner on Center Lake, but as Supt. of Parks & Rec. for the City of Warsaw, I have an interest in the health of Center Lake. The City operates and maintain public parks and a public beach at Center Lake, and contributes monetarily to the Lake Association.

APPENDIX II

VEGETATION CONTROL PERMIT

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)
Approved State Board of Accounts 2004

☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

Return to:
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Charlie Wheeler	Center Lake Conservation Association	
Rural Route or Street: 1212 Edgewater Drive		Phone Number: (574) 267-2930
City and State: Warsaw, IN		ZIP Code: 46580
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County	
Center Lake	Warsaw	Kosciusko	
Does water flow into a water supply		☐ Yes	☒ No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # A (3 acres)		LAT/LONG or UTM's Lat: 41.24894 Lon:-85.85906	
Total acres to be controlled: sum of 5 acres for lake	Proposed shoreline treatment length (ft) 3,383 ft	Perpendicular distance from shoreline (ft) adjacent	
Maximum Depth of Treatment (ft): 5 ft	Expected date(s) of treatment(s) 03/15/08 - 08/15/08		
Treatment method: ☒ Chemical	☐ Physical	☐ Biological Control	☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

There are three Eurasian watermilfoil priority treatment area for Center Lake in 2008. The 5 acres will be treated with an herbicide application of 2,4-D in 2008. Selected treatment locations for Eurasian watermilfoil are shown in the attached Eurasian watermilfoil priority treatment exhibit.

Plant survey method: ☒ Rake ☐ Visual ☐ Other (specify) Based on Tier II sampling conducted during July 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Sago pondweed		39
Chara		26
Coontail		21
Variable pondweed		4
Illinois pondweed		4
Yellow water lily		4
Spiny naiad		4
Eurasian watermilfoil	x	observed

Treatment Area # B (1.5 acres)	LAT/LONG or UTM's Lat: 41.25141 Lon:-85.85747		
Total acres to be controlled: sum of 5 acres for lake	Proposed shoreline treatment length (ft): 814 ft	Perpendicular distance from shoreline (ft): adjacent	
Maximum Depth of Treatment (ft): 5 ft	Expected date(s) of treatment(s): 03/15/08 - 08/15/08		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. same as previously stated on page 1

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Based on Tier II sampling conducted during July 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Sago pondweed		39
Chara		26
Coontail		21
Variable pondweed		4
Illinois pondweed		4
Yellow water lily		4
Spiny naiad		4
Eurasian watermilfoil	x	observed

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

Treatment Area # C (.5 acres)		LAT/LONG or UTM's Lat: 41.24386 Lon: -85.85402	
Total acres to be controlled	sum of 5 acres for lake	Proposed shoreline treatment length (ft) 145 ft	Perpendicular distance from shoreline (ft) adjacent
Maximum Depth of Treatment (ft)	10 ft	Expected date(s) of treatment(s) 03/15/08 - 08/15/08	

Treatment method: [x] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. same as previously stated on page 1

Plant survey method: [x] Rake [ ] Visual [ ] Other (specify) Based on Tier II sampling conducted during July 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		30
Sago pondweed		6
Eurasian watermilfoil	x	observed

Treatment Area #	LAT/LONG or UTM's Lat: Lon:	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	

Treatment method: [ ] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

Plant survey method: [ ] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community

APPENDIX III

RESOURCES FOR AQUATIC VEGETATION MANAGEMENT

Appendix III - Resources for

Aquatic Vegetation Management

In addition to the LARE Program, there are many other sources of potential funding to help improve the quality of Indiana Lakes. Many government agencies assist in projects designed to improve environmental quality.

The USDA has many programs to assist environmental improvement. More information on the following programs can be found at www.usda.gov.

Watershed Protection and Flood Prevention Program (USDA

Conservation Reserve Program (USDA)

Wetlands Reserve Program (USDA)

Grassland Reserve Program (USDA)

Wildlife Habitat Incentive Program (USDA)

Small Watershed Rehabilitation Program (USDA)

The following programs are offered by the U.S. Fish and Wildlife Service. More information about the Fish and Wildlife service can be found at www.fws.gov

Partners for Fish and Wildlife Program (U.S. Fish and Wildlife Service)

Bring Back the Natives Program (U.S. Fish and Wildlife Service)

Native Plant Conservation Program (U.S. Fish and Wildlife Service)

The Environmental Protection Agency, the Indiana Department of Environmental Management, and the U.S. Forest Service also have numerous programs for funding. A few of these are listed below. More information can be found at www.in.gov/idem and www.fs.fed.us/

U.S. Environmental Protection Agency Environmental Education Program (EPA)

NPDES Related State Program Grants (IDEM)

Community Forestry Grant Program (U.S. Forest Service)